10/089052

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UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: Group: Attorney Docket # 2019

Applicant(s) : KOELLE, G., ET AL

Serial No. :

Filed :

For : METHOD FOR ESTIMATING THE POLE WHEEL POSITION IN A CLAW POLE MACHINE

SIMULTANEOUS AMENDMENT

March 20, 2002

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

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Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

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Claims

1. A method for determining the position of a rotating component of a claw pole generator (1), which is operated in the R-S-T-system and whose regulation requires the transformation of the stator values from the R-S-T-system into the d, q-system and vice versa, characterized in that the claw pole generator (1) as an overall system (15) is divided into a non-detectable subsystem (18) and a detectable subsystem (19), which contains a filter element (20) and supplies output values (17).

2. The method according to claim 1, characterized in that the detectable subsystem (19) contains a Kalman-Bucy filter element (20), which estimates the status values of the detectable subsystem (19).

3. The method according to claim 1, characterized in that the detectable subsystem (19) contains a status detector, which recalculates status values of the detectable subsystem (19) after a status change.

4. The method according to claim 1, characterized in that the electric machine (1) is divided by a transformation matrix T into a non-detectable subsystem (18) and a detectable subsystem (19).

5. The method according to claim 2, characterized in that an L-matrix (21) in the filter element (20) of the detectable subsystem (19) is determined based on the optimization of a quadratic efficiency rating

$$J(u)=\int_{t_0}^{t_f}\left[x^T(t)\,Q\,x(t)+u^T(t)\,R\,u(t)\right]dt$$

6. The method according to claim 2, characterized in that the status values (9) of the detectable subsystem (19) of the overall system (15) of the claw pole machine (1) are estimated by means of the filter element (20).

7. The method according to claim 2 [or 3], characterized in that the status values of the non-detectable subsystem (18) are calculated based on the estimated and calculated status values of the detectable subsystem (19).

8. The method according to claim 6 [or 7], characterized in that the estimated status values and the calculated status values of the subsystems (18, 19) are inverse transformed through combination with a transformation matrix T.

9. The method according to claim 6, characterized in that the status values (9) include the transformed stator currents of the d, q-system, the angular frequency ω, and the magnet wheel angle of the rotor of the claw pole machine (1).

10. The method according to claim 1, characterized in that in order to determine the rotor starting position, a chronologically variable voltage source (32) is disposed in the exciter circuit (2, 32) of the claw pole machine (1), and a measurement (33, 34) of the phase voltages (5) of the stator winding (4) is executed.

Claims

1. A method for determining the position of a rotating component of a claw pole generator (1), which is operated in the R-S-T-system and whose regulation requires the transformation of the stator values from the R-S-T-system into the d, q-system and vice versa, characterized in that the claw pole generator (1) as an overall system (15) is divided into a non-detectable subsystem (18) and a detectable subsystem (19), which contains a filter element (20) and supplies output values (17).

2. The method according to claim 1, characterized in that the detectable subsystem (19) contains a Kalman-Bucy filter element (20), which estimates the status values of the detectable subsystem (19).

3. The method according to claim 1, characterized in that the detectable subsystem (19) contains a status detector, which recalculates status values of the detectable subsystem (19) after a status change.

4. The method according to claim 1, characterized in that the electric machine (1) is divided by a transformation matrix T into a non-detectable subsystem (18) and a detectable subsystem (19).

5. The method according to claim 2, characterized in that an L-matrix (21) in the filter element (20) of the detectable subsystem (19) is determined based on the optimization of a quadratic efficiency rating

$$J(u) = \int_{t_0}^{t_f} \left[x^T(t)\, Q x(t) + u^T(t)\, R u(t) \right] dt$$

6. The method according to claim 2, characterized in that the status values (9) of the detectable subsystem (19) of the overall system (15) of the claw pole machine (1) are estimated by means of the filter element (20).

7. The method according to claim 2, characterized in that the status values of the non-detectable subsystem (18) are calculated based on the estimated and calculated status values of the detectable subsystem (19).

8. The method according to claim 6, characterized in that the estimated status values and the calculated status values of the subsystems (18, 19) are inverse transformed through combination with a transformation matrix T.

9. The method according to claim 6, characterized in that the status values (9) include the transformed stator currents of the d, q-system, the angular frequency ω, and the magnet wheel angle of the rotor of the claw pole machine (1).

10. The method according to claim 1, characterized in that in order to determine the rotor starting position, a chronologically variable voltage source (32) is disposed in the exciter circuit (2, 32) of the claw pole machine (1), and a measurement (33, 34) of the phase voltages (5) of the stator winding (4) is executed.